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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/588,899	08/09/2006	Masayasu Miyata	9319A-001819/US/NP	4040

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EXAMINER
CAO, PHAT X

ART UNIT	PAPER NUMBER
2814	

MAIL DATE	DELIVERY MODE
02/18/2009	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/588,899	MIYATA, MASAYASU	
	Examiner	Art Unit	
	Phat X. Cao	2814	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *10 November 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,3-7 and 9-14* is/are pending in the application.

4a) Of the above claim(s) *9,11 and 12* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,3-7,10,13 and 14* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *09 August 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *8/9/06; 6/24/08*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. The cancellation of claims 2 and 8 in Paper filed on 8/9/06 is acknowledged.

2. Applicant's election with traverse of claims 1, 3-7, 10, 13, and 14 in the reply filed on 11/10/08 is acknowledged. The traversal is on the ground(s) that since all of the species are sufficiently related to each other that undue burden would not be placed upon the examiner by maintaining all of the species in a single application. This is not found persuasive because Applicant has not provided any reasons to support that the species proposed by the examiner are not distinct species. Furthermore, the search is not coextensive as evidenced by different search for different species. Therefore, the search and examination of the entire application would place a serious burden on the examiner.

The requirement is still deemed proper and is therefore made FINAL.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claim 6 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

It is noted that claim 6 depends from claim 1. Claim 1 claims a final device structure and claim 6 claims an intermediate structure of the device. Therefore, the limitation “each hydrogen atom in at least a part of the hydrogen atoms is replaced by a

deuterium atom" is unclear because how can each hydrogen atom be replaced by a deuterium atom when the device is already completed?

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 1, 3-4, 7, 10, 13, and 14 are rejected under 35 U.S.C. 102(b) as being anticipated by Kusunoki et al (US 2002/0066934).

Regarding claims 1 and 4, Kusunoki (Fig. 11) discloses a semiconductor device comprising: a base 1 which is mainly formed of a semiconductor material; an object 3 to be insulated from the base; and an insulating film 22 provided between the base 1 and the object 3 for insulating the object from the base, the insulating film 22 being formed of an insulative inorganic material as a main material, the insulative inorganic material containing silicon, oxygen and at least one kind of element (i.e., nitrogen) other than silicon and oxygen (par. [0074]), the insulating film 22 being provided in contact with the base 1, and the insulating film containing hydrogen atoms (par. [0074]), wherein the insulating film has a region where A and B satisfy the relation: B/A is 10 or less (B is more than A) in the case where the total concentration of the at least one kind of element nitrogen in the region is defined as A= 2.5X10^20/cm3 and the total

concentration of hydrogen in the region is defined as B= 3X10^20/cm3 (par. [0074]), in which the region is at least a part of the insulating film in the thickness direction thereof.

Regarding claims 3 and 7, Kusunoki (Fig. 11) further discloses that the average thickness of the gate insulating film 22 is 10nm (par. [0074]), the region is located at a portion of the gate insulating film 22 which resides within the thickness of the 10nm/3 of the gate insulating film 22 from the interface.

Regarding claim 10, it has been held that where the claimed and prior art products are identical or substantially identical in structure or composition, or are produced by identical or substantially identical processes, claimed properties or functions are presumed to be inherent. *In re Best*, 195 USPQ 430, 433 (CCPA 1977). In this case, because the gate insulating film of claimed device and the gate insulating film of Kusunoki's device both have substantially identical in structure and composition, claimed property of having the maximum leakage current passing through the gate insulating film being 2X10^-8 A/cm2 or less when the electric filed intensity in the gate insulating film being 3 MV/cm is presumed to be inherent.

Regarding claims 13-14, Kusunoki further discloses that an electronic apparatus comprising an electronic device of flash EEPROM (see Fig. 54, and par. [0008]).

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kusunoki et al in view of Hori et al (US 6,215,163).

Kusunoki does not disclose the concentration of hydrogen and the concentration of nitrogen are measured by Secondary Ion Mass Spectrometry (SIMS).

It is noted that the process limitations (i.e., measured by means of Secondary Ion Mass Spectrometry) recited in a "product by process" claim would not carry patentable weight in a claim drawn to structure because distinct structure is not necessarily produced. *In re Thorpe*, 227 USPQ 964 (Fed. Cir. 1985). However, Hori teaches the known feature of using Secondary Ion Mass Spectrometry to measure the concentration of hydrogen and the concentration of nitrogen in the silicon oxynitride insulating layer (see Fig. 4 and column 8, lines 8-13).

9. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kusunoki et al in view of Mitani et al (US 2002/0140043) .

Kusunoki does not disclose that each hydrogen atom in a part of the hydrogen atoms is replaced by a deuterium atom.

However, Mitani (Figs. 6-7) teaches that the Si-H bond which is especially weak from an electrical viewpoint is diminished in the vicinity of the interface with the silicon substrate, so that hydrogen is substituted by deuterium so as to form Si-D bonds which are electrically robust (par. [0053]). Therefore, it would have been obvious to modify the gate insulating film of Kusunoki by replacing hydrogen atoms with deuterium atoms in order to form Si-D bonds which are electrically robust.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Phat X. Cao whose telephone number is (571)272-1703. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on (571)272-1705. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/P. X. C./
Primary Examiner, Art Unit 2814

/Phat X. Cao/
Primary Examiner, Art Unit 2814